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COVID 19 AND EBOLA: VIRUSES THAT TERRORIZE THE WORLD

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ABSTRACT

To highlight the lessons learned from the Ebola outbreak that may inform our approach to the COVID-19 pandemic, particularly related to the widespread disruption of health care, ophthalmic disease manifestations, and vision health systems strengthening for future outbreaks. Coronavirus disease 2019 (COVID-19), first detected in China in December, 2019, has become a worldwide health emergency, with significant disruption of all aspects of society, including travel, business, and medical care. While this pandemic has had unprecedented effects on health care delivery in the United States, experiences from recent Ebola virus disease (EVD) outbreaks in Africa provide insight and inform our approach to COVID-19 and outbreak preparedness. Like COVID-19, the rapid emergence of Ebola required new clinical and surgical approaches to understand its associated spectrum of ophthalmic complications and the potential for Ebola viral persistence within the eye and in tear film. Recent reports of ophthalmic findings associated with COVID-19 include conjunctivitis, retinopathy, and molecular evidence of virus within the tear film in a minority of cases. Yet, more rigorous approaches to understand ophthalmic disease and transmission risk associated with COVID-19 are needed. Gaps also remain in our understanding of eye disease associated with other high priority emerging infectious diseases including Nipah, Lassa Fever, Marburg virus and others. Thoroughly understanding the ophthalmic findings and transmission risk associated with COVID-19 isparamount during this pandemic, providing additional measures of safety while resuming ophthalmic care for all patients.

KEYWORDS: Covid 19, ebola, pandemic, outbreaks, vaccines.

INTRODUCTION

Coronavirus disease 2019 (COVID-19), first detected in Wuhan City, Hubei Province, China in December, 2019, was declared a Public Health Emergency of International Concern by the World Health Organization (WHO) in January 30th, 2020, and formally received the *Pandemic* designation on March 11th, 2020.[1] By March, most countries worldwide had entered into a shelter-in-place or lockdown period, during which only essential travel and business were allowed.[2] Within the U.S., over 100,000 deaths were attributed to COVID-19 by the end of May, 2020[3], and most non-essential travel and business had ceased with gradual re-openings.[4] Of particular importance to ophthalmologists, all non-emergent, non-urgent medical care was delayed to prevent person-to-person transmission in clinical and surgical settings and preserve personal protective equipment (PPE). This disruption of medical care has been both the choice of healthcare workers (HCW) and patients, likely motivated to stay away from clinical settings[5], and was recommended by the government, public health organizations, and major medical societies including the Centers for Disease Control and Prevention, American Academy of Ophthalmology, the American College of Surgeons, and the Centers for Medicare and Medicaid Services.[6,7] While the rapidity and ubiquity of the disruption of both society and medical care has been unprecedented, other disease outbreaks, primarily outside of the U.S., have paralleled our recent experience. Ebola virus disease (EVD), for instance, became a worldwide concern during the unprecedented West African outbreak from 2014–2016.[8] During this time, 12 countries were affected and in response to this public health emergency, many countries in West Africa imposed restrictions including curfews, closure of national borders, and strict temperature and symptom monitoring in health care facilities and businesses.[9] Within the U.S. health care facilities began screening patients for fever and individuals returning from endemic regions.[10] Hospitals trained staff and readied personal protective equipment for potential interaction with infected patients.[11] The United States National Ebola Training and Education Center was developed to disseminate knowledge regarding how to safely and effectively treat infected patients.[12]

COVID 19

COVID-19 is a viral respiratory disease caused by a new coronaviruscalledSARS-COV-2.

- The disease was first detected in late 2019 and is present worldwide.
- Although most healthy people will develop mild to moderate disease, up to one in five young adults with COVID-19 may require hospitalization.

Types of Covid 19

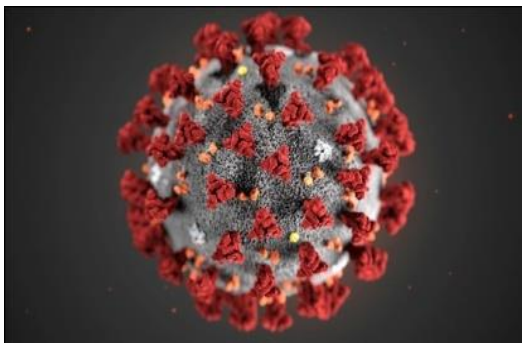
The coronavirus is a virus family that cause a lot of illness that are mild to life-threatening. It is the cousin of the both **Middle East Respiratory Syndrome**(MERS) virus and more popular **Severe Acute Respiratory Syndrome**(SARS) virus. There are only seven strains of coronaviruses that are known to cause illness in human beings.[13]

- **Human Coronavirus 229E (HCoV-229E):** It is the alpha-coronavirus.
- **Human Coronavirus OC43 (HCoV-OC43):** It is the beta-coronavirus.
- **SARS Coronavirus:** It is the beta coronavirus.
- **Human Coronavirus NL63:** It is the alpha-coronavirus. It was first reported in the Netherland.
- **HKU-1 Coronavirus:** It is the beta-coronavirus. It was originated in Hong Kong.
- **MERS CoV:** It is the beta-coronavirus.
- **SARS CoV-2:** It is the beta-coronavirus. It has been reported in 2019 from Wuhan, China.

How Does COVID-19 Spread?

People are infected mainly person to person:

- Between people who are in close contact with one another (within about 6 feet).
- Through respiratory droplets produced when an infected person coughs, sneezes, or talks. These droplets can: » Land in themouths or noses of people who are nearby or possibly be inhaled into the lungs. » Contaminate surfaces that are then touched by people who then touch their mouth, nose or possibly their eyes.[14]



Signs and Symptoms of COVID-19

The signs and symptoms of COVID can appear 2-14 days after exposure. In some people, symptoms of COVID-19 can worsen after the first week of illness.[14]

Most Common	Additional symptoms
• Fever	• Headache
• Chills	• Sore throat
• Fatigue	• New loss of taste or smell
• Cough	• Runny nose
• Shortness of breath	• Bloody sputum
• Muscle pains	• Vomiting and diarrhoea

Prevention and Control Measures of COVID-19

- Isolation of patient in well-ventilated room.
- Use triple medical masks, discard mask after 8 hours of use or earlier.
- Mask should be discarded only after disinfecting it with 1% sodium hydration.
- Sufficient rest and drink a lot of fluids to maintain adequate hydration.
- Follow respiratory etiquettes at all times.
- Frequent washing of hands with soap and water or clean with alcohol base sanitizer.
- Do not share personal items with other people.
- Ensure cleaning of surfaces in the room with 1% hypochlorite solution.
- Quarantine rules must be followed wherever necessary.
- Do not allow COVID-19 affected person (symptomatic or asymptomatic) in community.
- If spreadability rate is uncontrolled, then measure like "Lockdown" is preferred on priority basis.
- To make availability of oxygen ventilators.[13]

Non-Pharmacological Management of COVID-19

- Stem therapy.
- Eating vitamin C rich fruit and foods.
- Drinking warm water on regular basis.
- Eating immunity boosters.
- Avoiding person-to-person direct contact.
- Washing hands using soap regularly.
- Wearing mask outside and even at home.
- Using sanitizer on regular basis.[13]

Pharmacological Management of COVID-19

Following drugs are given to patients suffering from Covid-19 for the management of symptoms. Still, currently no drug is available for complete cure of Covid-19.

- Nucleotide analogue prodrug: Remdesivir.
- RNA polymerase antiviral agent: Favipiravir.
- Oral hepatitis C virus protease inhibitor: Danoprevir combined with ritonavir.
- Hyperimmune plasma: Plasma from Covid-19 patients who had recovered.[13]

Various Approved Vaccines for COVID-19 in India

The approved vaccines for Covid-19 in India are:

- Bharat Biotech: Covaxin, vaccine type: Inactivated.
- Serum Institute of India: Covishield, vaccine type: Nonreplicating viral vector.
- Oxford/AstraZeneca: Vaxzevira, vaccine type: Nonreplicating viral vector.
- Janssen (Johnson and Johnson): Ad26.CoV-2.S, vaccine type: Nonreplicating viral vector.
- Gamaleya: Sputnik V, vaccine type: Nonreplicating viral vector.
- Gamaleya: Sputnik light, vaccine type: Nonreplicating viral vector.
- Moderna: Spikevax, vaccine type: RNA.
- Zydus Cadila: ZyCoV-D, vaccine type: DNA.
- Biological E Limited: Corbevax, vaccine type: Protein subunit.
- Serum Institute of India: COVOVAX (Novavax formulation), vaccine type: Protein subunit.[13]

Overview of human corona virus outbreaks

Coronaviruses are large, enveloped, positive-strand RNA viruses that can be divided into four genera: alphacoronavirus, betacoronavirus, deltacoronavirus and gammacoronavirus.[10] Alpha and beta CoV are known to cause human disease. Until recently, human coronavirus (HCoV) received relatively less attention as they were considered low-virulence organisms and believed to cause only mild, self-limiting upper respiratory infection in humans.[11,12]

The first coronavirus outbreak, SARS, caused by SARS-CoV, occurred in the Guangdong Province of China in 2002–2003. The mortality rate during this outbreak was 9%, with a higher mortality rate (50%) in the elderly population. This outbreak was largely contained because of relatively inefficient transmission, which mainly occurred through direct contact

with infected individuals. Hence, strict quarantine of infected patients restricted the spread of the disease, and the outbreak ceased after affecting 8098 people and causing death in 774 patients.[15]

The next coronavirus outbreak occurred in the Middle East (Saudi Arabia) in 2012 and was named the MERS-CoV. This virus caused severe lower respiratory infection with a mortality rate of about 35%. Per the World Health Organization's (WHO) report, the total number of reported cases globally was 2519, out of which 866 patients died.[15] Both MERS-CoV and SARS-CoV originated from bats. However, serologic studies for antibody testing in dromedary camels suggested that camels were the intermediate host for MERS-CoV.[16]

MERS-CoV shared many clinical features with SARS-CoV, such as severe atypical pneumonia. However, there were some differences, with MERS causing prominent gastrointestinal (GI) symptoms and acute kidney injury. The investigators attributed the differences in clinical manifestations to the involvement of different receptors used by these two viruses. While MERS binds to the human dipeptidyl peptidase receptor (present in the lower airway, GI tract, and kidney), SARS binds to the angiotensin-converting enzyme (ACE)-2 receptor.[12,14] The treatments for these coronavirus outbreaks largely relied on supportive care.

On December 31, 2019, China reported a cluster of atypical pneumonia cases with an unknown etiology.[17] Early cases were associated with the Huanan Seafood Wholesale Market in Wuhan, Hubei Province. Soon after that, the causative pathogen was identified as a novel betacoronavirus (SARS-CoV-2), and the disease was ultimately named COVID-19. SARS-CoV-2 has high sequence homology with bat coronaviruses (~87% identical sequences with bat-SL-CoVZC45 and bat-SL-CoVZXC21), which supports the hypothesis of bat origin. When compared with SARS-CoV and MERS-CoV, SARS-CoV-2 has a genetic similarity of 79 and 50%, respectively.[15] The clinical presentation of COVID-19 ranges from asymptomatic carriage to severe viral pneumonia causing acute respiratory distress syndrome. Fever and GI symptoms are common. At the time of this report, COVID-19 has spread across the globe with 2,397,216 confirmed cases and 162,956 deaths according to the WHO situation report.[18]

EBOLA

Ebola is a rare and deadly disease caused by infection with an ebolavirus. Four species of the virus can cause disease in humans.[14]

Types of Ebola

- Zaire virus (species Zaire ebola virus).
- Sudan virus (species Sudan ebola virus).
- Taï Forest virus (species Taï Forest ebolavirus, formerly Côte d'Ivoire ebolavirus).
- Bundibugyo virus (species Bundibugyo ebolavirus).[13]

How does Ebola spread?

People get Ebola through direct contact with:

- The body fluids (such as urine, feces, saliva, sweat, vomit, breast milk, semen, and vaginal fluids) of a person who is sick or has died from Ebola.
- Objects contaminated with body fluids of a person who is sick with or has died of Ebola.
- Infected animals (fruit bats, apes, monkeys, duikers). It is also possible for people to get Ebola through direct contact with:
- Semen of a man who has recovered from Ebola (for example, by having oral, vaginal, or anal sex).
- Breast milk of a woman who has recovered from Ebola.[14]

Signs and Symptoms of Ebola

The signs and symptoms of Ebola can appear 2-21 days after exposure. Symptoms of Ebola develop over several days and become worse over time.[14]

Most Common	Additional Symptoms
• Fever	• Unexplained hemorrhaging

• Aches and pains, such as severe headache, muscle and joint pain, and stomach pain
• Weakness and fatigue
• Diarrhoea and vomiting
• Red eyes
• Skin rash
• Hiccups (late stage)

Prevention and Control Measures of Ebola

- Avoid contact with blood and body fluids.
- Stay away from areas where the virus is common.
- Avoid the contact of bodies of anyone who has died from the disease.
- Avoid contact with wild animals like bats, monkeys and their meat.
- Avoid contact with articles that may have came in contact with an infected persons blood or body fluids.
- Immunization with Ebola vaccine.[13]

Non-Pharmacological Management of Ebola

The ebola outbreak in West Africa is over. If you are travelingto these areas, it is advisable to follow these simple procedures:

- A regular wash of hands with soap and water.
- Wash and properly peel fruits and vegetables.
- Avoid physical contact with person showing symptoms.
- Avoid bushmeats.
- Avoid eating raw meat of dead animals.
- Avoid handling dead animals.[13]

Pharmacological Management of Ebola

No proven treatment options are available for the condition, though researchers are working on it.

The symptoms of Ebola are managed with oral or intravenous fluid

- Oxygen.
- Blood pressure medications.
- Blood transfusions.[13]

OVERVIEW OF EBOLA OUTBREAKS

Ebola viruses belong to the family Filoviridae, a taxonomic group of enveloped, non-segmented, negative-strand RNA viruses. There are five different species of EBOV that can infect humans, but they differ in their virulence and disease progression, with a case fatality rate ranging from 40% for Bundibugyo EBOV to 70–90% for Zaire EBOV. Humans infected with EBOV initially have non-specific symptoms, such as nausea, vomiting, and diarrhea, with the hemorrhagic phase occurring in half of the cases.[19] Outbreaks of EVD have mainly been limited to Africa; however, in recent times, a small number for patients have been transferred to hospitals with modern technology in the USA and Germany. The mortality rate in Africa is often very high compared to patients who have received supportive care in developed countries. There are no approved drugs for the treatment of EVD. During the 2014–2016 West African outbreak and subsequent outbreak in the Democratic Republic of Congo (DRC), several investigational treatments, such as antibody therapy and remdesivir, were evaluated in clinical trials.[20]

CONCLUSION

In this case, both Ebola and COVID-19 had an incidence of zoonotic origin where the causes for both Ebola and covid originated from bats. Furthermore, Ebola and COVID-19 had similar effects on the upper respiratory tract and caused temperature rise. Ebola is spread during the last stage of the disease through blood and sweat. In contrast, COVID-19 spreads more easily through breathing, coughing or talking in close contact. According to an early study from China, approximately 80 percent of COVID-19 cases are mild, meaning they show few or no symptoms.

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